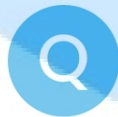




## QUIZZES

Practice test 1 unit 4



10 Questions



7 min

### Topics

Types of progressive waves (Transverse waves, Longitudinal waves), Periodic waves (Transverse periodic waves, Longitudinal periodic waves)

Start Quiz

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06 : 56



1/10



7 min



Hint

Q : The wavelength ' $\lambda$ ' of a wave depends on the speed ' $v$ ' of the wave and its frequency ' $f$ '. Decide which of the following is correct?

A

$$f = \frac{v}{\lambda}$$

B

$$f = v\lambda$$

C

$$f = \frac{\lambda}{v}$$

D

$$f = v\lambda^{-2}$$

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06 : 53



2/10



7 min



Hint

Q : The waves, in which the particles of the medium vibrate in a direction perpendicular to the direction of wave motion, is known as

A

Transverse waves

B

Longitudinal waves

C

Propagated waves

D

Magnetic waves

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06 : 52



3/10



7 min



Hint

Q : A boat at anchor is rocked by waves, whose crests are 100m apart and velocity is 25m/s. The boat bounces up once in every

A

2500s

B

75s

C

4s

D

0.25s

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06 : 50



4/10



7 min



Hint

Q : What are the essential properties a medium must possess for the propagation of mechanical waves?



Stable pressure



Maximum friction



Constant temperature



Minimum friction

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06 : 48



5/10



7 min



Hint

Q : The diagram below shows the propagation of a wave.  
Which points are in same phase

A

F, G

B

C and E

C

B and G

D

B and F

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06 : 46



6/10



7 min



Hint

Q : The diagram below shows an instantaneous position of a string as a transverse progressive wave travels along it from

left to right

Which one of the following correctly shows the direction of the velocity of the points 1, 2 and 3 on the string

A

1 → 2 → 3 →

B

1 → 2 ← 3 →

C

1 ↓ 2 ↓ 3 ↓

D

1 ↓ 2 ↑ 3 ↓ article velocity

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06 : 44



7/10



7 min



Hint

Q : The distance between two consecutive crests in a wave train produced in a string is 5 cm. If 2 complete waves pass through any point per second, the velocity of the wave is

A

10 cm/sec

B

2.5 cm/sec

C

5 cm/sec

D

15 cm/sec

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06 : 43



8/10



7 min



Hint

Q : If velocity of sound in a gas is 360 m/s and the distance between a compression and the nearest rarefaction is 1m, then the frequency of sound is

A

90 Hz

B

180 Hz

C

360 Hz

D

720 Hz

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06 : 41



9/10



7 min



Hint

Q :  
others

Which of the following is different from



Velocity



Wavelength



Frequency



Amplitude

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06 : 39



10/10



7 min



Hint

Q : The type of waves that can be propagated through solid is



Transverse



Longitudinal



Both (a) and (b)



None of these

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## QUIZ RESULT

Practice test 1 unit 4



10



7 min



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Result Detail

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Correct	0
Incorrect	0
Unattempted	10

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Physics

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## Practice test 1 unit 4



Correct



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Incorrect



1/10

Q : The wavelength ' $\lambda$ ' of a wave depends on the speed ' $v$ ' of the wave and its frequency ' $f$ '. Decide which of the following is correct?

A

$$f = \frac{v}{\lambda}$$

B

$$f = v\lambda$$

C

$$f = \frac{\lambda}{v}$$

D

$$f = v\lambda^{-2}$$

Explanation

$$v = f\lambda \Rightarrow f = \frac{v}{\lambda}$$

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## Practice test 1 unit 4



Correct



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Incorrect



2/10

Q : The waves, in which the particles of the medium vibrate in a direction perpendicular to the direction of wave motion, is known as

A

Transverse waves

B

Longitudinal waves

C

Propagated waves

D

Magnetic waves

### Explanation

In transverse waves, particles of the medium vibrate in a direction perpendicular of the wave

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## Practice test 1 unit 4



Correct



Unattempted



Incorrect



3/10

Q : A boat at anchor is rocked by waves, whose crests are 100m apart and velocity is 25m/s. The boat bounces up once in every

A

2500s

B

75s

C

4s

D

0.25s

Explanation

$$\lambda = 100\text{m}, v = 25\text{m/s}$$
$$T = \lambda / v = 100 / 25 = 4\text{s}.$$

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## Practice test 1 unit 4



Correct



Unattempted



Incorrect



4/10

Q : What are the essential properties a medium must possess for the propagation of mechanical waves?

A

Stable pressure

B

Maximum friction

C

Constant temperature

D

Minimum friction

### Explanation

The friction force amongst the particles of the medium should be negligibly small so that they continue oscillating for a sufficiently long time and the wave travels a sufficiently long distance through the medium

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## Practice test 1 unit 4



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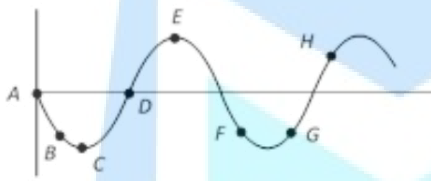


Incorrect



5/10

Q : The diagram below shows the propagation of a wave.  
Which points are in same phase



A

F, G

B

C and E

C

B and G

D

B and F

Explanation

Points B and F are in same phase as they are 1 distance apart.



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## Practice test 1 unit 4



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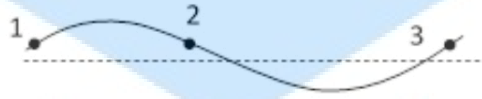


Incorrect



6/10

Q : The diagram below shows an instantaneous position of a string as a transverse progressive wave travels along it from



left to right

Which one of the following correctly shows the direction of the velocity of the points 1, 2 and 3 on the string

A

1 → 2 → 3 →

B

1 → 2 ← 3 →

C

1 ↓ 2 ↓ 3 ↓

D

1 ↓ 2 ↑ 3 ↓ particle velocity

### Explanation

$$(v_p) = -v_x$$

Slope of the graph at that point At point 1 : Slope of the curve is positive, hence particle velocity is negative or downward (↓) At point 2 : Slope negative, hence particle velocity is positive or upwards (↑) At point 3 : Again slope of the curve is positive, hence particle velocity is negative or downward (↓)

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## Practice test 1 unit 4



Correct



Unattempted



Incorrect



7/10

Q : The distance between two consecutive crests in a wave train produced in a string is 5 cm. If 2 complete waves pass through any point per second, the velocity of the wave is

A

10 cm/sec

B

2.5 cm/sec

C

5 cm/sec

D

15 cm/sec

Explanation

$$v = f\lambda = 2 \times 5 = 10 \text{ cm/sec}$$

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## Practice test 1 unit 4



Correct



Unattempted



Incorrect



8/10

Q : If velocity of sound in a gas is 360 m/s and the distance between a compression and the nearest rarefaction is 1m, then the frequency of sound is

A

90 Hz

B

180 Hz

C

360 Hz

D

720 Hz

### Explanation

Distance between a compression and the nearest rarefaction is  $\lambda/2=1\text{m}$ .

Hence

$$f=v/\lambda=360/2=180\text{Hz}$$



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## Practice test 1 unit 4



Correct



Unattempted



Incorrect



9/10

Q :  
others

Which of the following is different from

A

Velocity

B

Wavelength

C

Frequency

D

Amplitude

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## Practice test 1 unit 4



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Incorrect



10/10

Q : The type of waves that can be propagated through solid is

A

Transverse

B

Longitudinal

C

Both (a) and (b)

D

None of these

Explanation

Since solid has both the properties (rigidity and elasticity)

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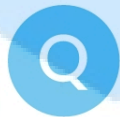
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## QUIZZES

Practice test 2 unit 4



10 Questions



7 min

Topics

Speed of sound in air, Principle of superposition/  
superposition of sound waves

Start Quiz

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06 : 58



1/10



7 min



Hint

Q : The ratio of speed of sound in hydrogen to the speed of sound in oxygen is:



1:2



2:1



1:4



4:1

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06 : 57



2/10



7 min



Hint

Q : At what temperature the velocity of sound in air is two times its velocity at  $10^{\circ}\text{C}$ :



859 K



$10^{\circ}\text{C}$



1132 K



$890^{\circ}\text{C}$

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06 : 55



Q 3/10

7 min

Hint

Q : Velocity of sound in vacuum at  $0^{\circ}\text{C}$  is

A 340m/sec

B 332 m/sec

C 280 m/sec

D zero

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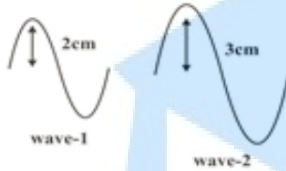


Q 4/10

7 min

Hint

Q : Two identical waves of different amplitudes are shown in the figure. What will be the ratio of their intensities?



A 9:4

B 3:2

C 5:1

D 4:9

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06 : 51



5/10



7 min



Hint

Q : If pressure of a medium is increased by four times, then velocity of sound



Increases by four times



Decreases by four times



Increases by two times



Remains unchanged

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06 : 49



6/10



7 min



Hint

Q : Due to a distant explosion, what is the relation between ground tremor and sound



Both are heard at the same time



Ground tremor is heard first



Sound is heard first



Can not be predicted

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06 : 47



Q 7/10

7 min

Hint

Q : A point source emits sound equally in all directions in a non-absorbing medium, Two points P and Q are at distance of 2m and 3m respectively from the source. The ratio of the intensities of the waves at P and Q is

A 9 : 4

B 2 : 3

C 3 : 2

D 4 : 9

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06 : 44



8/10



7 min



Hint

Q : The minimum intensity of sound is zero at a point due to two sources of nearly equal frequencies, when



A Two sources are vibrating in opposite phase



B The amplitude of two sources are equal



C At the point of observation, the amplitudes of two S.H.M. produced by two sources are equal and both the S.H.M. are along the same straight line



D Both the sources are in the same phase

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06 : 42



9/10



7 min



Hint

Q : If the ratio of amplitude of wave is 2 : 1, then the ratio of maximum and minimum intensity is



9 : 1



1 : 9



4 : 1



1 : 4

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06 : 38



10/10



7 min



Hint

Q :

Human ears can sense sound waves travel ling in air having wavelength of



$10^{-3}\text{m}$



$10^{-2}\text{m}$



1m



$10^2\text{m}$

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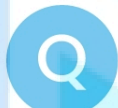
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## QUIZ RESULT

Practice test 2 unit 4



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7 min



14-Apr-2021



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Result Detail

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Correct	0
Incorrect	0
Unattempted	10

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Physics

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## Practice test 2 unit 4



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1/10

Q : The ratio of speed of sound in hydrogen to the speed of sound in oxygen is:

A

1:2

B

2:1

C

1:4

D

4:1

Explanation

$$\frac{v_H}{v_o} = \sqrt{\frac{\rho_o}{\rho_H}}$$
$$\frac{v_H}{v_o} = \sqrt{\frac{16\rho_H}{\rho_H}}$$
$$v_H : v_o = 4:1$$



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## Practice test 2 unit 4



Correct



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Incorrect



2/10

Q : At what temperature the velocity of sound in air is two times its velocity at  $10^{\circ}\text{C}$ :

A

859 K

B

$10^{\circ}\text{C}$

C

1132 K

D

$890^{\circ}\text{C}$

### Explanation

$$T_1 = 10^{\circ}\text{C}$$

$$T_1 = 10 + 273$$

$$T = 283\text{K}$$

$$T_2 = n^2 T_1 \text{ (only applicable when 'T' in kelvin)}$$

$$T_2 = 2^2(283)$$

$$T_2 = 1132\text{K}$$

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## Practice test 2 unit 4



Correct



Unattempted



Incorrect



3/10

Q : Velocity of sound in vacuum at  $0^{\circ}\text{C}$  is

A

340m/sec

B

332 m/sec

C

280 m/sec

D

zero

### Explanation

Sound wave is a mechanical wave. So sound can't propagate through vacuum and its velocity in vacuum is zero.

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## Practice test 2 unit 4



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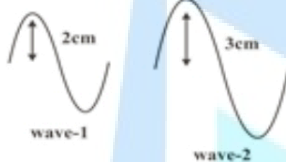


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4/10

Q : Two identical waves of different amplitudes are shown in the figure. What will be the ratio of their intensities?



A

9:4

B

3:2

C

5:1

D

4:9

Explanation

$$\text{Intensity} \propto (\text{amplitude})^2 \Rightarrow \frac{I_1}{I_2} = \frac{A_1^2}{A_2^2} = \frac{(2)^2}{(3)^2} = \frac{4}{9}$$



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## Practice test 2 unit 4



Correct



Unattempted



Incorrect



5/10

Q : If pressure of a medium is increased by four times, then velocity of sound

A

Increases by four times

B

Decreases by four times

C

Increases by two times

D

Remains unchanged

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## Practice test 2 unit 4



Correct



Unattempted



Incorrect



6/10

Q : Due to a distant explosion, what is the relation between ground tremor and sound

A

Both are heard at the same time

B

Ground tremor is heard first

C

Sound is heard first

D

Can not be predicted

### Explanation

Speed of sound is more in solids than in gases.

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## Practice test 2 unit 4



Correct



Unattempted



Incorrect



8/10

Q : The minimum intensity of sound is zero at a point due to two sources of nearly equal frequencies, when

A

Two sources are vibrating in opposite phase

B

The amplitude of two sources are equal

C

At the point of observation, the amplitudes of two S.H.M. produced by two sources are equal and both the S.H.M. are along the same straight line

D

Both the sources are in the same phase

### Explanation

If two waves of nearly equal frequency superpose, they give beats if they both travel in straight line and  $I_{\min}=0$  if they have equal amplitudes.

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## Practice test 2 unit 4



Correct



Unattempted



Incorrect



9/10

Q : If the ratio of amplitude of wave is 2 : 1, then the ratio of maximum and minimum intensity is

A

9 : 1

B

1 : 9

C

4 : 1

D

1 : 4

Explanation

$$\frac{I_{\max}}{I_{\min}} = \left( \frac{\frac{a_1}{a_2} + 1}{\frac{a_1}{a_2} - 1} \right)^2 = \left( \frac{2 + 1}{2 - 1} \right)^2 = 9/1$$

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## Practice test 2 unit 4



Correct



Unattempted



Incorrect



10/10

Q :

Human ears can sense sound waves travel ling in air having wavelength of

A

$10^{-3}\text{m}$

B

$10^{-2}\text{m}$

C

1m

D

$10^2\text{m}$

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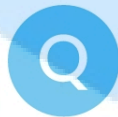
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## QUIZZES

Practice test 3 unit 4



10 Questions



7 min

### Topics

Stationary waves/ standing waves, Stationary waves  
in a stretched string/fundamental frequency and  
harmonics

Start Quiz

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06 : 58



1/10



7 min



Hint

Q : A stretched string of length 1 m vibrates with a fundamental frequency of 1 Hz. The velocity of wave is



2 m/s



1 m/s



3 m/s



4 m/s

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06 : 56



2/10



7 min



Hint

Q : If tension in a string is made four times then speed of wave becomes



four times



one times



double



none

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06 : 54



3/10



7 min



Hint

Q : Only odd harmonics are present in



Open pipe only



Closed pipe only



Both open and closed pipes



Stretched string

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06 : 52



4/10



7 min



Hint

Q : Energy is not carried by:



Longitudinal progressive waves



Electromagnetic waves



Transverse progressive waves



Stationary wave

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06 : 50



5/10



7 min



Hint

Q : Which type of wave is produced in a resonance tube?



Longitudinal



Transverse stationary



Transverse



Longitudinal stationary

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06 : 48



6/10



7 min



Hint

Q : In stationary wave



Strain is maximum at nodes



Strain is maximum at antinodes



Strain is minimum at nodes



Amplitude is zero at all the points

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06 : 47



7/10



7 min



Hint

Q : In stationary waves, antinodes are the points where there is

A

Minimum displacement and minimum pressure change

B

Minimum displacement and maximum pressure change

C

Maximum displacement and maximum pressure change

D

Maximum displacement and minimum pressure change

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06 : 45



8/10



7 min



Hint

Q : Stationary waves are so called because in them



The particles of the medium are not disturbed at all



The particles of the medium do not execute SHM



There occurs no flow of energy along the wave



The interference effect can't be observed

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06 : 43



9/10



7 min



Hint

Q : A string in musical instrument is 50 cm long and its fundamental frequency ( $n$ ) is 800 Hz. If a frequency ( $n$ ) of 1000 Hz is to be produced, then required length of string is

A

62.5 cm

B

50 cm

C

40 cm

D

37.5 cm

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06 : 40



10/10



7 min



Hint

Q :

In a sitar wire which one of the following types of vibration is produced?

A

Progressive longitudinal

B

Stationary longitudinal

C

Progressive transverse

D

Stationary transverse

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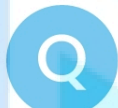
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## QUIZ RESULT

Practice test 3 unit 4



10



7 min



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0 sec



0/10



0.0%

Result Detail

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Correct	0
Incorrect	0
Unattempted	10

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Physics

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0%



## Practice test 3 unit 4



Correct



Unattempted



Incorrect



1/10

Q : A stretched string of length 1 m vibrates with a fundamental frequency of 1 Hz. The velocity of wave is

A

2 m/s

B

1 m/s

C

3 m/s

D

4 m/s

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



2/10

Q : If tension in a string is made four times then speed of wave becomes

A

four times

B

one times

C

double

D

none

Explanation

$$v = \sqrt{\frac{F}{m}}$$

$$v' = \sqrt{\frac{4F}{m}}$$

$$v' = 2\sqrt{\frac{F}{m}}$$

$$v' = 2v$$



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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



3/10

Q : Only odd harmonics are present in

A

Open pipe only

B

Closed pipe only

C

Both open and closed pipes

D

Stretched string

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



4/10

Q : Energy is not carried by:

A

Longitudinal progressive waves

B

Electromagnetic waves

C

Transverse progressive waves

D

Stationary wave

Explanation

Stationary waves don't transfer energy or momentum.

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



5/10

Q : Which type of wave is produced in a resonance tube?

A

Longitudinal

B

Transverse stationary

C

Transverse

D

Longitudinal stationary

Explanation

Longitudinal stationary waves

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



6/10

Q : In stationary wave

A

Strain is maximum at nodes

B

Strain is maximum at antinodes

C

Strain is minimum at nodes

D

Amplitude is zero at all the points

Explanation

At nodes pressure change (strain) is maximum

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



7/10

Q : In stationary waves, antinodes are the points where there is



Minimum displacement and minimum pressure change



Minimum displacement and maximum pressure change



Maximum displacement and maximum pressure change



Maximum displacement and minimum pressure change

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



8/10

Q : Stationary waves are so called because in them

A

The particles of the medium are not disturbed at all

B

The particles of the medium do not execute SHM

C

There occurs no flow of energy along the wave

D

The interference effect can't be observed

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## Practice test 3 unit 4



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Unattempted



Incorrect



9/10

Q : A string in musical instrument is 50 cm long and its fundamental frequency (n) is 800 Hz. If a frequency (n) of 1000 Hz is to be produced, then required length of string is

A

62.5 cm

B

50 cm

C

40 cm

D

37.5 cm

Explanation

$$n_1 l_1 = n_2 l_2 \Rightarrow 800 \times 50 = 1000 \times l_2 \Rightarrow l_2 = 40 \text{ cm}$$

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## Practice test 3 unit 4



Correct



Unattempted



Incorrect



10/10

Q :

In a sitar wire which one of the following types of vibration is produced?

A

Progressive longitudinal

B

Stationary longitudinal

C

Progressive transverse

D

Stationary transverse

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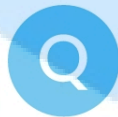
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## QUIZZES

Practice test 5 unit 4



10 Questions



7 min

Topics

Doppler effect

Start Quiz

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06 : 58



1/10



7 min



Hint

Q : A car blowing a horn of frequency 350 Hz is moving normally towards a wall with a speed of 5 m/s. The beat frequency heard by a person standing between the car and the wall is (speed of sound in air = 350 m/s)

A

zero

B

3.5 Hz

C

5 Hz

D

10 Hz

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06 : 55



2/10



7 min



Hint

Q : If the star is moving away from the earth; the wavelength of the waves emitted from the star have a



Longer wavelength



Smaller wavelength



No shift



Yellow shift

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06 : 53



Q 3/10

7 min

Hint

Q : An observer is moving towards stationary source with velocity  $\frac{v}{3}$ . The apparent frequency would be if  $v$  is the speed of sound and  $f$  is the original frequency

A  $(\frac{4}{3})f$

B  $(\frac{2}{3})f$

C  $(\frac{3}{4})f$

D  $(\frac{3}{2})f$

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06 : 50



4/10



7 min



Hint

Q :

A source of sound of frequency 450 cycles/sec is moving towards a stationary observer with 34 m/sec speed. If the speed of sound is 340 m/sec, then the apparent frequency will be

A

410 cycles/sec

B

550 cycles/sec

C

500 cycles/sec

D

450 cycles/sec

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06 : 47



Q 5/10

7 min

Hint

Q : An observer with velocity  $u_0$  is receding from a sound source of frequency  $f$  and wavelength  $\lambda$  then number of waves received in one second by the observer if speed of sound is  $v$ .

A  $\frac{\lambda}{v - u_0}$

B  $\frac{v - u_0}{\lambda}$

C  $\left(\frac{v}{v - u_0}\right)f$

D  $\left(\frac{v}{v + u_0}\right)f$

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06 : 45



6/10



7 min



Hint

Q : Assuming that universe is expanding, if the spectrum of light coming from a star which is going away from earth is tested, then in the wavelength of light

A

There will be no change

B

The spectrum will move to infrared region

C

The spectrum will seems to shift to ultraviolet side

D

None of the above

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06 : 43



7/10



7 min



Hint

Q : The velocity of light emitted by a source S observed by an observer O, who is at rest with respect to S is  $c$ . If the observer moves towards S with velocity  $v$ , the velocity of light as observed will be

A

$c + v$

B

$c - v$

C

$c$

D

$2c$

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06 : 41



8/10



7 min



Hint

Q : Due to Doppler's effect, the shift in wavelength observed is  $0.1 \text{ \AA}$  for a star producing wavelength  $6000 \text{ \AA}$ . Velocity of recession of the star will be

A

2.5 km/s

B

10 km/s

C

5 km/s

D

20 km/s

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06 : 39



9/10



7 min



Hint

Q : The apparent frequency in Doppler's effect does not depend upon



Speed of the observer



Distance between the observer and source



Speed of the source



Frequency of the source

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06 : 35



10/10



7 min



Hint

Q : A car sounding its horn at 480Hz moves towards a high wall at a speed of 20m/s, the frequency of the reflected sound heard by the man sitting in the car will be nearest to

A

480Hz

B

510Hz

C

540Hz

D

570Hz

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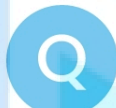
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## QUIZ RESULT

Practice test 5 unit 4



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7 min



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0 sec



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Result Detail

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Correct	0
Incorrect	0
Unattempted	10

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Physics

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Correct



Unattempted



Incorrect



1/10

Q : A car blowing a horn of frequency 350 Hz is moving normally towards a wall with a speed of 5 m/s. The beat frequency heard by a person standing between the car and the wall is (speed of sound in air = 350 m/s)

A

zero

B

3.5 Hz

C

5 Hz

D

10 Hz

## Explanation

As

$$f' = \left( \frac{v}{v - u_s} \right) f$$

$$= \left( \frac{350}{350 - 5} \right) (350)$$
$$350 \text{ ms}^{-1}$$

For beat frequency

$$n = f' - f$$
$$\approx 0$$

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



2/10

Q : If the star is moving away from the earth; the wavelength of the waves emitted from the star have a

A

Longer wavelength

B

Smaller wavelength

C

No shift

D

Yellow shift

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



3/10

Q : An observer is moving towards stationary source with velocity  $\frac{v}{3}$ . The apparent frequency would be if  $v$  is the speed of sound and  $f$  is the original frequency

A

$$\left(\frac{4}{3}\right) f$$

B

$$\left(\frac{2}{3}\right) f$$

C

$$\left(\frac{3}{4}\right) f$$

D

$$\left(\frac{3}{2}\right) f$$

Explanation

$$f_A = \left(\frac{v + \frac{v}{3}}{v}\right) f = \left(\frac{4v}{3v}\right) f$$

$$f_A = \left(\frac{4}{3}\right) f$$

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



4/10

Q :

A source of sound of frequency 450 cycles/sec is moving towards a stationary observer with 34 m/sec speed. If the speed of sound is 340 m/sec, then the apparent frequency will be

A

410 cycles/sec

B

550 cycles/sec

C

500 cycles/sec

D

450 cycles/sec

Explanation

$$f^1 = \left( \frac{v}{v - u_s} \right) f$$

$$f^1 = \left( \frac{340}{340 - 34} \right) 450$$

$$f^1 = 500 \text{ Hz}$$

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



5/10

Q : An observer with velocity  $u_0$  is receding from a sound source of frequency  $f$  and wavelength  $\lambda$  then number of waves received in one second by the observer if speed of sound is  $v$ .

A

$$\frac{\lambda}{v - u_0}$$

B

$$\frac{v - u_0}{\lambda}$$

C

$$\left( \frac{v}{v - u_0} \right) f$$

D

$$\left( \frac{v}{v + u_0} \right) f$$

Explanation

$$f^1 = \left( \frac{v - u_0}{v} \right) f$$

$$f^1 = \left( \frac{v - u_0}{v} \right) \frac{v}{\lambda}$$

$$f^1 = \frac{v - u_0}{\lambda}$$

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



6/10

Q : Assuming that universe is expanding, if the spectrum of light coming from a star which is going away from earth is tested, then in the wavelength of light



There will be no change



The spectrum will move to infrared region



The spectrum will seems to shift to ultraviolet side



None of the above

### Explanation

Due to expansion of universe, the star will go away from the earth thereby increasing the observed wavelength. Therefore the spectrum will shift to the infrared region.

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



7/10

Q : The velocity of light emitted by a source S observed by an observer O, who is at rest with respect to S is  $c$ . If the observer moves towards S with velocity  $v$ , the velocity of light as observed will be

A

$c + v$

B

$c - v$

C

$c$

D

$2c$

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



8/10

Q : Due to Doppler's effect, the shift in wavelength observed is  $0.1 \text{ \AA}$  for a star producing wavelength  $6000 \text{ \AA}$ . Velocity of recession of the star will be

A

2.5 km/s

B

10 km/s

C

5 km/s

D

20 km/s

Explanation

$$\frac{\Delta\lambda}{\lambda} = \frac{v}{c} \therefore v = \frac{\Delta\lambda}{\lambda} c = \frac{0.1}{6000} \times 3 \times 10^5 \text{ km/s} = 5 \text{ km/s}$$

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



9/10

Q : The apparent frequency in Doppler's effect does not depend upon

A

Speed of the observer

B

Distance between the observer and source

C

Speed of the source

D

Frequency of the source

### Explanation

Apparent frequency in Doppler's effect depends on frequency of source, direction and velocity of source and observer. It does not depend on the distance between observer and source.

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## Practice test 5 unit 4



Correct



Unattempted



Incorrect



10/10

Q : A car sounding its horn at 480Hz moves towards a high wall at a speed of 20m/s, the frequency of the reflected sound heard by the man sitting in the car will be nearest to

A

480Hz

B

510Hz

C

540Hz

D

570Hz

### Explanation

After reflection from the wall, the sound moves towards observer in the car,

$$\gamma' = (v + v_0) / (v - v_s) \times \gamma = (340 + 20) / (340 - 20) \times 480 = 540\text{Hz}.$$

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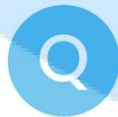
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## QUIZZES

Practice test 6 unit 4



10 Questions



7 min

### Topics

Characteristics of simple harmonic motion,  
Instantaneous displacement, Time period

Start Quiz

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06 : 58



1/10



7 min



Hint

Q : The frequency of wave is 0.002 Hz. Its time period is:



100 s



5000 s



500 s



50 s

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06 : 56



2/10



7 min



Hint

Q : The product of frequency and time period is:



4



1



2



6

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06 : 54



3/10



7 min



Hint

Q :

A body performs simple harmonic motion with a period of 0.063s. The maximum speed of the body is  $3.0 \text{ ms}^{-1}$ . What are the values of the amplitude  $x_0$  (m) and angular frequency  $\omega$  ( $\text{rads}^{-1}$ )?



$x_0 = 0.03, \omega = 100$



$x_0 = 0.19, \omega = 16$



$x_0 = 5.3, \omega = 16$



$x_0 = 3.3, \omega = 100$

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06 : 52



4/10



7 min



Hint

Q :

If the time period of the oscillation is 20 micro-sec, than what will be the frequency of that oscillating body?

A

5000 Hz

B

50000 Hz

C

20000 Hz

D

1000 Hz

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06 : 50



5/10



7 min



Hint

Q :

The acceleration of a particle performing S.H.M. is  $12 \text{ cm/sec}^2$  at a distance of 3 cm from the mean position. Its time period is

A

0.5 sec

B

1.0 sec

C

2.0 sec

D

3.14 sec

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06 : 48



6/10



7 min



Hint

Q :

Which of the following is a necessary and sufficient condition for S.H.M



Constant period



Constant acceleration



Proportionality between acceleration and displacement from equilibrium position



Proportionality between restoring force and displacement from equilibrium position

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06 : 46



7/10



7 min



Hint

Q :

The phase (at a time  $t$ ) of a particle in simple harmonic motion tells

A

Only the position of the particle at time  $t$

B

Only the direction of motion of the particle at time  $t$

C

Both the position and direction of motion of the particle at time  $t$

D

Neither the position of the particle nor its direction of motion at time  $t$

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06 : 42



8/10



7 min



Hint

Q :

A particle is moving with constant angular velocity along the circumference of a circle. Which of the following statements is true



The particle so moving executes S.H.M



The projection of the particle on any one of the diameters executes S.H.M.



The projection of the particle on any of the diameters executes S.H.M.



None of the above

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06 : 40



9/10



7 min



Hint

Q :

A simple harmonic motion is represented by  $F(t) = 10\sin(20t + 0.5)$  The amplitude of the S.H.M. is

A

$a = 30$

B

$a = 20$

C

$a = 10$

D

$a = 5$

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06 : 36



10/10



7 min



Hint

Q :

A particle executing simple harmonic motion along y-axis has its motion described by the equation  $y = A \sin(\omega t) + B$ . The amplitude of the simple harmonic motion is



A



B



A+B



A-B

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## QUIZ RESULT

Practice test 6 unit 4



10



7 min



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0 sec



0/10



0.0%

Result Detail

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Correct	0
Incorrect	0
Unattempted	10

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Physics

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0%



## Practice test 6 unit 4



Correct



Unattempted



Incorrect



1/10

Q : The frequency of wave is 0.002 Hz. Its time period is:

A

100 s

B

5000 s

C

500 s

D

50 s

Explanation

$$T = \frac{1}{f} = \frac{1}{0.002}$$

$$T = 500\text{sec}$$

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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



2/10

Q : The product of frequency and time period is:

A

4

B

1

C

2

D

6

Explanation

$$f = \frac{1}{T}$$
$$f \times T = 1$$

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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



3/10

Q :

A body performs simple harmonic motion with a period of 0.063s. The maximum speed of the body is  $3.0 \text{ ms}^{-1}$ . What are the values of the amplitude  $x_0$  (m) and angular frequency  $\omega$  ( $\text{rads}^{-1}$ )?

A

$x_0 = 0.03, \omega = 100$

B

$x_0 = 0.19, \omega = 16$

C

$x_0 = 5.3, \omega = 16$

D

$x_0 = 3.3, \omega = 100$

Explanation

$$v_o = x_o \omega = 3 = x_o \left( \frac{2\pi}{T} \right) \Rightarrow x_o = 3 \left( \frac{0.063}{2(3.14)} \right) = 0.03m$$
$$\omega = \frac{2\pi}{T} = \frac{2 \times 3.14}{0.063} = 100 \text{ radsec}^{-1}$$



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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



4/10

Q :

If the time period of the oscillation is 20 micro-sec, than what will be the frequency of that oscillating body?

A

5000 Hz

B

50000 Hz

C

20000 Hz

D

1000 Hz

Explanation

$$f = \frac{1}{T} = \frac{1}{20 \times 10^{-6}} = 50000 \text{ Hz}$$

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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



5/10

Q :

The acceleration of a particle performing S.H.M. is  $12 \text{ cm/sec}^2$  at a distance of 3 cm from the mean position. Its time period is

A

0.5 sec

B

1.0 sec

C

2.0 sec

D

3.14 sec

Explanation

$$T = 2\pi \sqrt{\frac{\text{Displacement}}{\text{Acceleration}}} = 2\pi \sqrt{\frac{3}{12}} = \pi = 3.14$$



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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



6/10

Q :

Which of the following is a necessary and sufficient condition for S.H.M

A

Constant period

B

Constant acceleration

C

Proportionality between acceleration and displacement from equilibrium position

D

Proportionality between restoring force and displacement from equilibrium position

Explanation

$$F = -kx$$

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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



7/10

Q :

The phase (at a time  $t$ ) of a particle in simple harmonic motion tells

A

Only the position of the particle at time  $t$

B

Only the direction of motion of the particle at time  $t$

C

Both the position and direction of motion of the particle at time  $t$

D

Neither the position of the particle nor its direction of motion at time  $t$

Explanation

Phase determine the position and direction of motion of particle excecuting SHM

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## Practice test 6 unit 4



Correct



Unattempted



Incorrect



8/10

Q :

A particle is moving with constant angular velocity along the circumference of a circle. Which of the following statements is true

A

The particle so moving executes S.H.M

B

The projection of the particle on any one of the diameters executes S.H.M.

C

The projection of the particle on any of the diameters executes S.H.M.

D

None of the above

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## Practice test 6 unit 4



Correct



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9/10

Q :

A simple harmonic motion is represented by  $F(t) = 10\sin(20t + 0.5)$ . The amplitude of the S.H.M. is

A

$a = 30$

B

$a = 20$

C

$a = 10$

D

$a = 5$

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## Practice test 6 unit 4



Correct



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10/10

Q :

A particle executing simple harmonic motion along y-axis has its motion described by the equation  $y = A \sin(\omega t) + B$ . The amplitude of the simple harmonic motion is

A

A

B

B

C

A+B

D

A-B

Explanation

The amplitude is a maximum displacement from the mean position.

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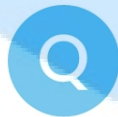
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## QUIZZES

Practice test 7 unit 4



10 Questions



7 min

Topics

Simple Pendulum, Energy conservation in SHM

Start Quiz

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1/10



7 min



Hint

Q : The total energy of a particle executing S.H.M. of amplitude A is proportional to



$A^2$



$A^{-2}$



A



$1/A$

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06 : 56



Q 2/10

7 min

Hint

Q : The P.E of a particle executing SHM at a distance  $x$  from its equilibrium position is

A  $\frac{1}{2}m\omega^2x^2$

B  $\frac{1}{2}m\omega^2a^2$

C  $\frac{1}{2}m\omega^2(a^2 - x^2)$

D Zero

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06 : 55



3/10



7 min



Hint

Q : The variation of P.E and K.E with displacement is essential for maintaining



Oscilltions



linear motion



random motion



translatory motion

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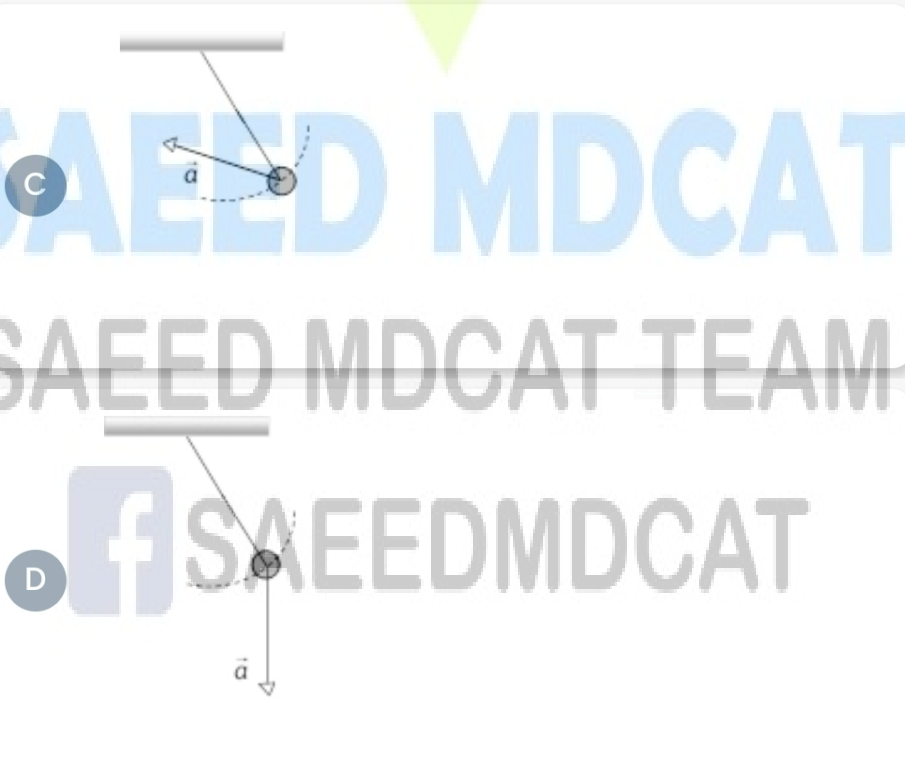
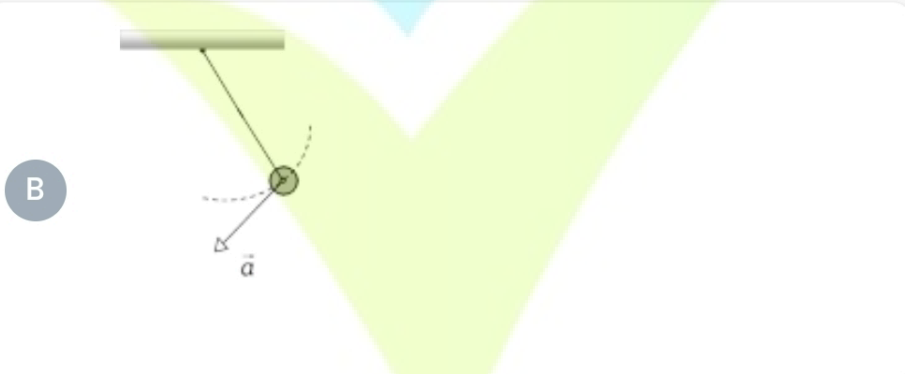
06 : 31



Q :

A simple pendulum is oscillating without damping. When the displacement of the bob is less than maximum, its acceleration vector

**a** is correctly shown in





06 : 28



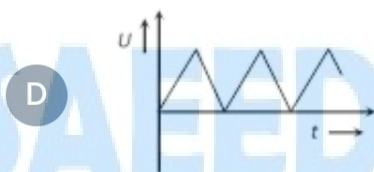
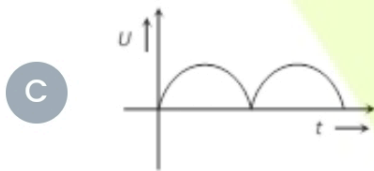
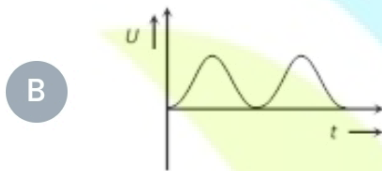
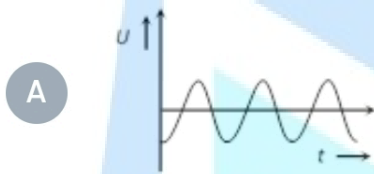
Q 5/10

7 min

Hint

Q :

As a body performs S.H.M., its potential energy  $U$  varies with time as indicated in



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06 : 26



6/10



7 min



Hint

Q :

If the length of the simple pendulum is increased by 44%, then what is the change in time period of pendulum

A

22%

B

20%

C

33%

D

44%

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SAEEDMDCAT

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06 : 24



7/10



7 min



Hint

Q :

To show that a simple pendulum executes simple harmonic motion, it is necessary to assume that



Length of the pendulum is small



Mass of the pendulum is small



Amplitude of oscillation is small



Acceleration due to gravity is small

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06 : 22



8/10



7 min



Hint

Q :

A simple pendulum is taken from the equator to the pole. Its period

A

Decreases

B

Increases

C

Remains the same

D

Decreases and then increases

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06 : 20



9/10



7 min



Hint

Q :

Time period of a simple pendulum will be double, if we

A

Decrease the length 2 times

B

Decrease the length 4 times

C

Increase the length 2 times

D

Increase the length 4 times

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06 : 15



10/10



7 min



Hint

Q :

Length of a simple pendulum is  $l$  and its maximum angular displacement is  $q$ , then its maximum K.E. is



$mgl\sin\theta$



$mgl(1+\sin\theta)$



$mgl(1+\cos\theta)$



$mgl(1-\cos\theta)$

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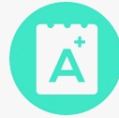
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## QUIZ RESULT

Practice test 7 unit 4



10



7 min



14-Apr-2021



0 sec



0/10



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Result Detail

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Correct	0
Incorrect	0
Unattempted	10



Physics

0%



Practice test 7 unit 4



Correct



Unattempted



Incorrect



1/10

Q : The total energy of a particle executing S.H.M. of amplitude A is proportional to



$A^2$



$A^{-2}$



A



$1/A$

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Practice test 7 unit 4



Correct



Unattempted



Incorrect



2/10

Q : The P.E of a particle executing SHM at a distance  $x$  from its equilibrium position is

A

$$\frac{1}{2}m\omega^2x^2$$

B

$$\frac{1}{2}m\omega^2a^2$$

C

$$\frac{1}{2}m\omega^2(a^2 - x^2)$$

D

Zero

Explanation

$$P.E = \frac{1}{2}Kx^2$$

$$\omega = \sqrt{\frac{K}{m}} \rightarrow K = \omega^2 m \therefore P.E = \frac{1}{2}\omega^2 mx^2$$



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## Practice test 7 unit 4



Correct



Unattempted



Incorrect



3/10

Q : The variation of P.E and K.E with displacement is essential for maintaining

A

Oscilltions

B

linear motion

C

random motion

D

translatory motion

### Explanation

In oscillatory motion at mean position K.E is maximum, at extreme position P.E is maximum, so in order to conserve T.E, P.E must change into K.E and K.E into P.E

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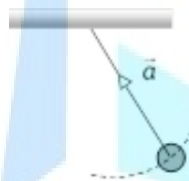
Practice test 7 unit 4

Q :

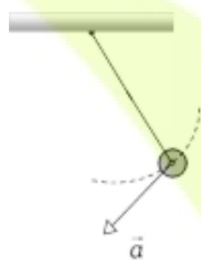
A simple pendulum is oscillating without damping. When the displacement of the bob is less than maximum, its acceleration vector

**a** is correctly shown in

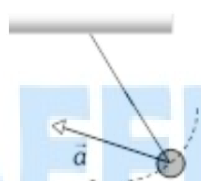
A



B



C



D



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9



Practice test 7 unit 4



Correct



Unattempted



Incorrect

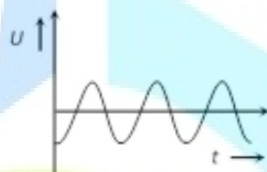


5/10

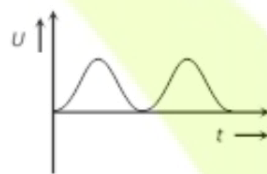
Q :

As a body performs S.H.M., its potential energy  $U$  varies with time as indicated in

A



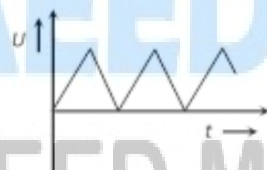
B



C



D



Explanation



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PE varies from zero to maximum. It is always positive sinusoidal function.

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Practice test 7 unit 4



Correct



Unattempted



Incorrect



6/10

Q :

If the length of the simple pendulum is increased by 44%, then what is the change in time period of pendulum

A

22%

B

20%

C

33%

D

44%

Explanation

$$T = 2\pi\sqrt{\frac{l}{g}} \Rightarrow \frac{T_2}{T_1} = \sqrt{\frac{l_2}{l_1}} = \sqrt{\frac{144}{100}} = \frac{12}{10}$$
$$\frac{T_2 - T_1}{T_1} \times 100 = 20$$



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Practice test 7 unit 4



Correct



Unattempted



Incorrect



7/10

Q :

To show that a simple pendulum executes simple harmonic motion, it is necessary to assume that

A

Length of the pendulum is small

B

Mass of the pendulum is small

C

Amplitude of oscillation is small

D

Acceleration due to gravity is small

Explanation

- If amplitude is large motion will not remain simple harmonic.

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Practice test 7 unit 4



Correct



Unattempted



Incorrect



8/10

Q :

A simple pendulum is taken from the equator to the pole. Its period

A

Decreases

B

Increases

C

Remains the same

D

Decreases and then increases

Explanation

As we go from equator to pole the value of  $g$  increases.  
Therefore time period of simple pendulum

$T \propto \sqrt{\frac{1}{g}}$  decreases



Practice test 7 unit 4



Correct



Unattempted



Incorrect



9/10

Q :

Time period of a simple pendulum will be double, if we

A

Decrease the length 2 times

B

Decrease the length 4 times

C

Increase the length 2 times

D

Increase the length 4 times

Explanation

$$T \propto \sqrt{l}$$

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Practice test 7 unit 4

Q :

Length of a simple pendulum is  $l$  and its maximum angular displacement is  $\theta$ , then its maximum K.E. is

A

$$mgl\sin\theta$$

B

$$mgl(1+\sin\theta)$$

C

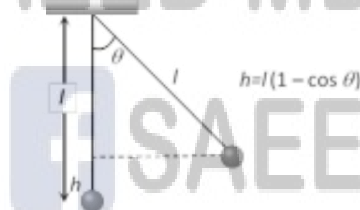
$$mgl(1+\cos\theta)$$

D

$$mgl(1-\cos\theta)$$

Explanation

- Kinetic energy will be maximum at mean position.



From law of conservation of energy maximum kinetic energy at mean position = Potential energy at displaced position  
 $K.E_{\max} = mgh = mgl(1 - \cos\theta)$

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